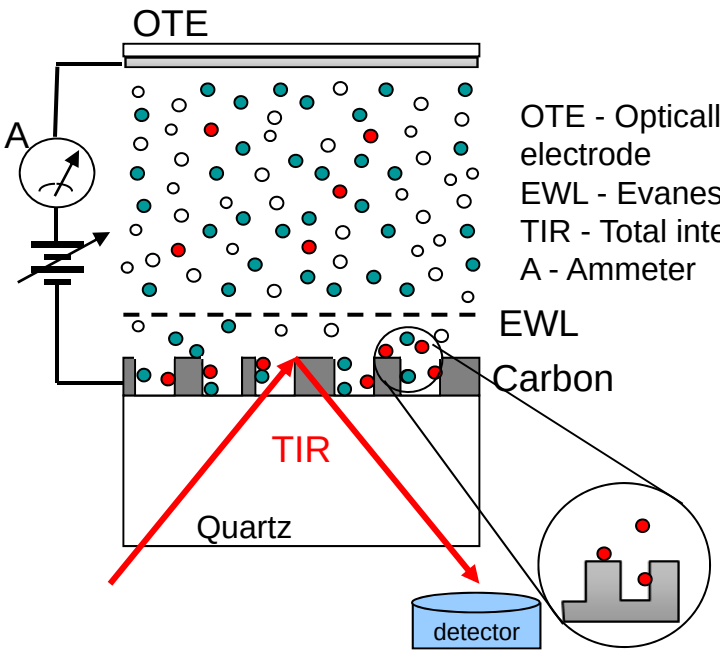
Interfacial ion transport and charge/discharge dynamics of supercapacitors

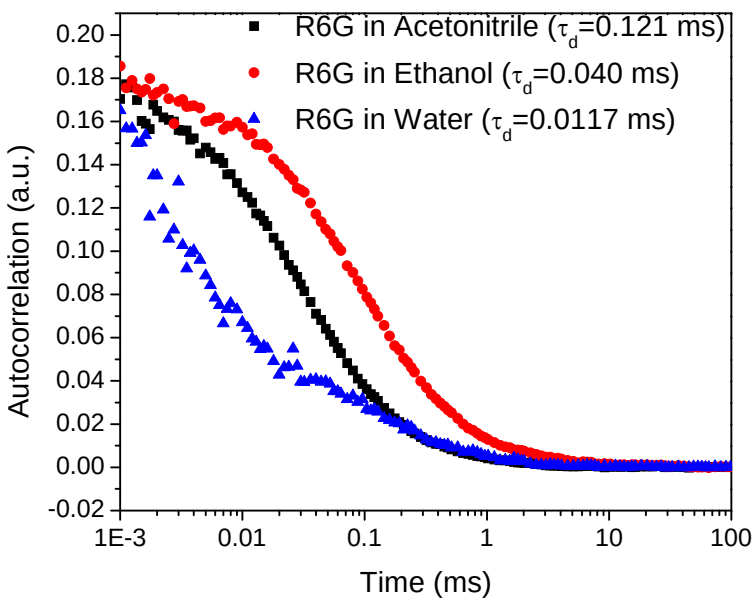
Scientific Challenge: **How do the ion transport and electrode charge/discharge dynamics depend on the pore sizes of carbon electrodes, ion size and charge, electrolytes, as well as solvent choice?**

Goal: **Understanding factors controlling the ion transport and charge/discharge dynamics of carbon-electrolyte interfaces**

Approach: **Laser spectroscopy including fluorescence correlation spectroscopy (for diffusional dynamics) and time resolved single photon counting (for dye lifetime alteration)**



OTE - Optically transparent electrode
EWL - Evanescent wave layer
TIR - Total internal reflection
A - Ammeter



Diffusion times for Rhodamine 6G (R6G) cation in a thin electrolyte layer immediately above a conducting indium tin oxide (ITO) surface. Similar data have been recorded at a planar carbon electrode at differing applied potentials.

When the pore sizes of carbon electrodes are smaller than or similar to the size of solvated ions, pore-bound ions are expected to be partly or fully desolvated. The photophysical properties of the desolvated ions will be different from the free solution values.